

# Implementing Program-Based Interventions to Improve Population-Level Lung Cancer Outcomes: 'the Mid-South Miracle'

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Joint NIH Board of Scientific Advisors/National Cancer Advisory Board Meeting: Thursday, December 9, 2021

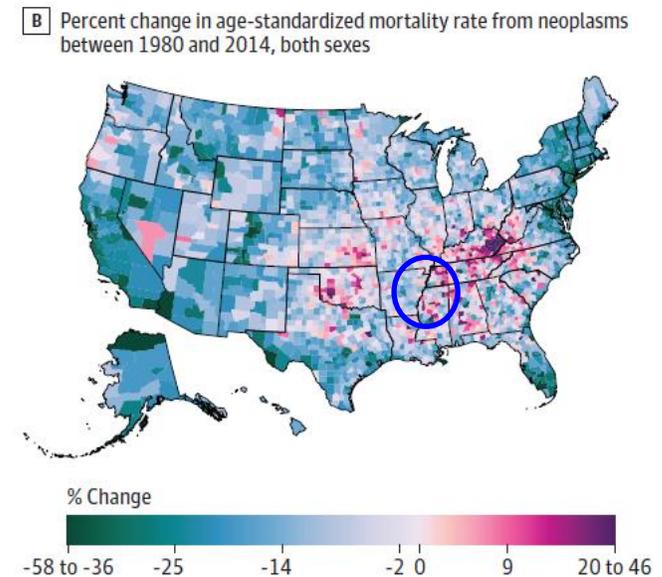
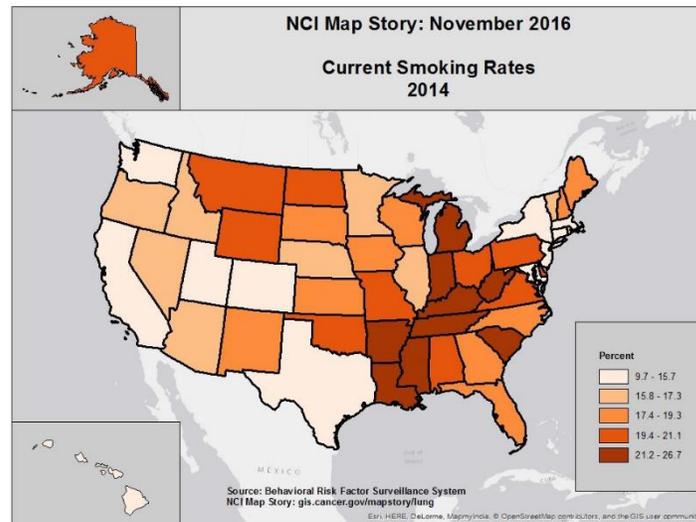
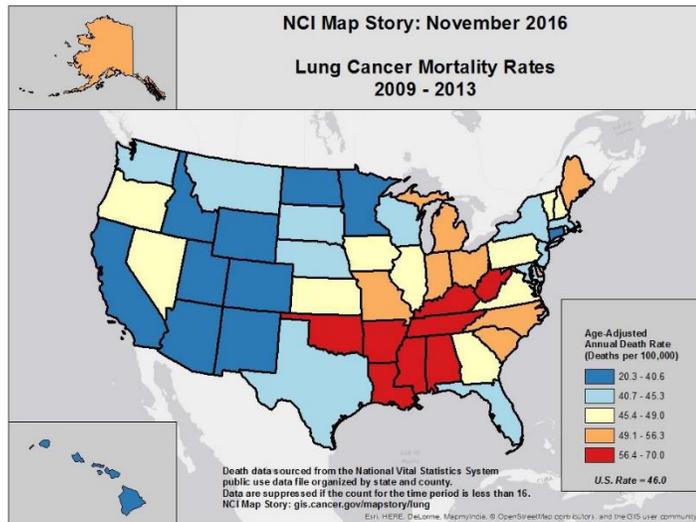


Get Better.

# Objectives

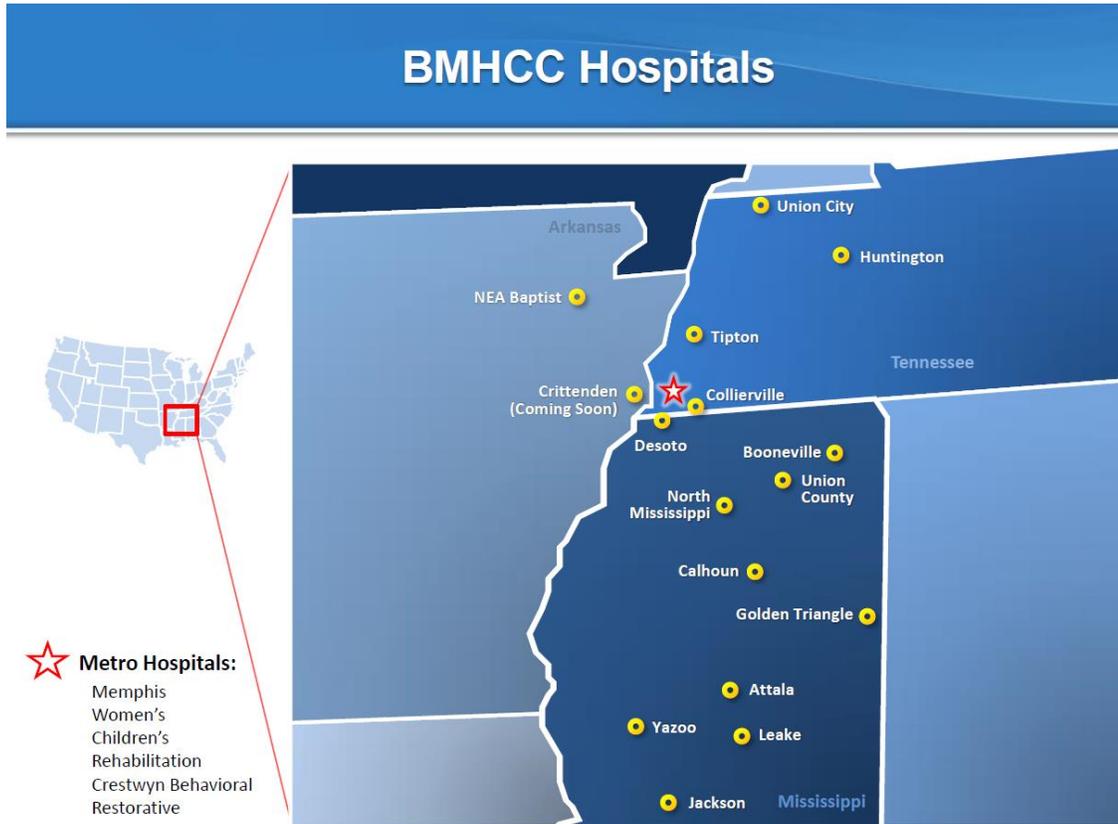
- BMHCC and the geography of US lung cancer.
- Population impact pyramid and the 'Mid-South Miracle.'
- Implementation of effective interventions: tobacco control; early detection; multidisciplinary decision-making; surgical, pathology quality improvement; clinical research infrastructure.
- Quantifying population-level impact.

# Epidemiology of Lung Cancer in the US: A Tale of Geographic Disparity



*Trends and Patterns of Disparity in Cancer Mortality Among US Counties. Mokdad AH et al, JAMA.2017; 317(4):388-406.*

# If BMHCC was a state....



	State	Estimated new lung cancer cases, 2020 <sup>1</sup>	NCI-Designated Cancer Center?
37	Nebraska	1270	1
38	New Hampshire	1220	1
	<b>BMHCC</b>	<b>1200 - 1300</b>	<b>0</b>
39	New Mexico	1040	1
40	Idaho	990	0
41	Rhode Island	920	0
42	Delaware	890	0
43	Hawaii	870	1
44	Montana	770	0
45	Utah	730	1
46	South Dakota	590	0
47	Vermont	570	0
48	North Dakota	460	0
49	Alaska	400	0
50	Wyoming	320	0
	DC	300	1

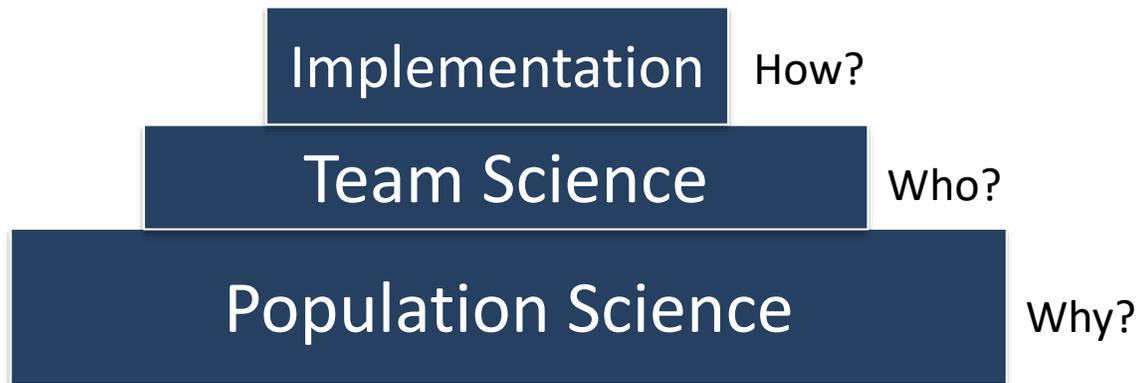
<sup>1</sup> Siegel RL, Miller KD, Jemal A. Cancer Statistics, 2020. CA Cancer J Clin 2020;70:7-30.

# Implementing The Mid-South Miracle:

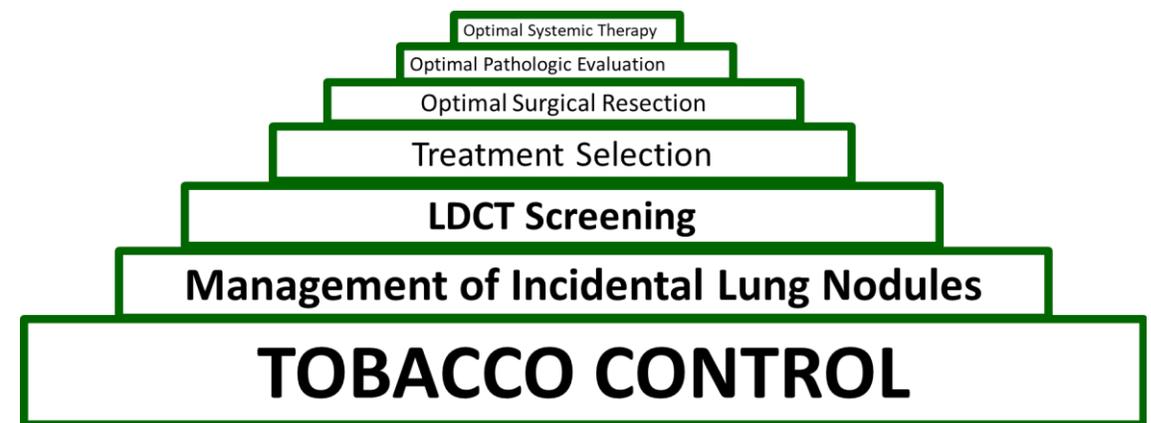
Goal: Reduce Lung Cancer Mortality >25% Over 10 Years

Objectives: sustained, rigorous implementation of seven specific clinical programs

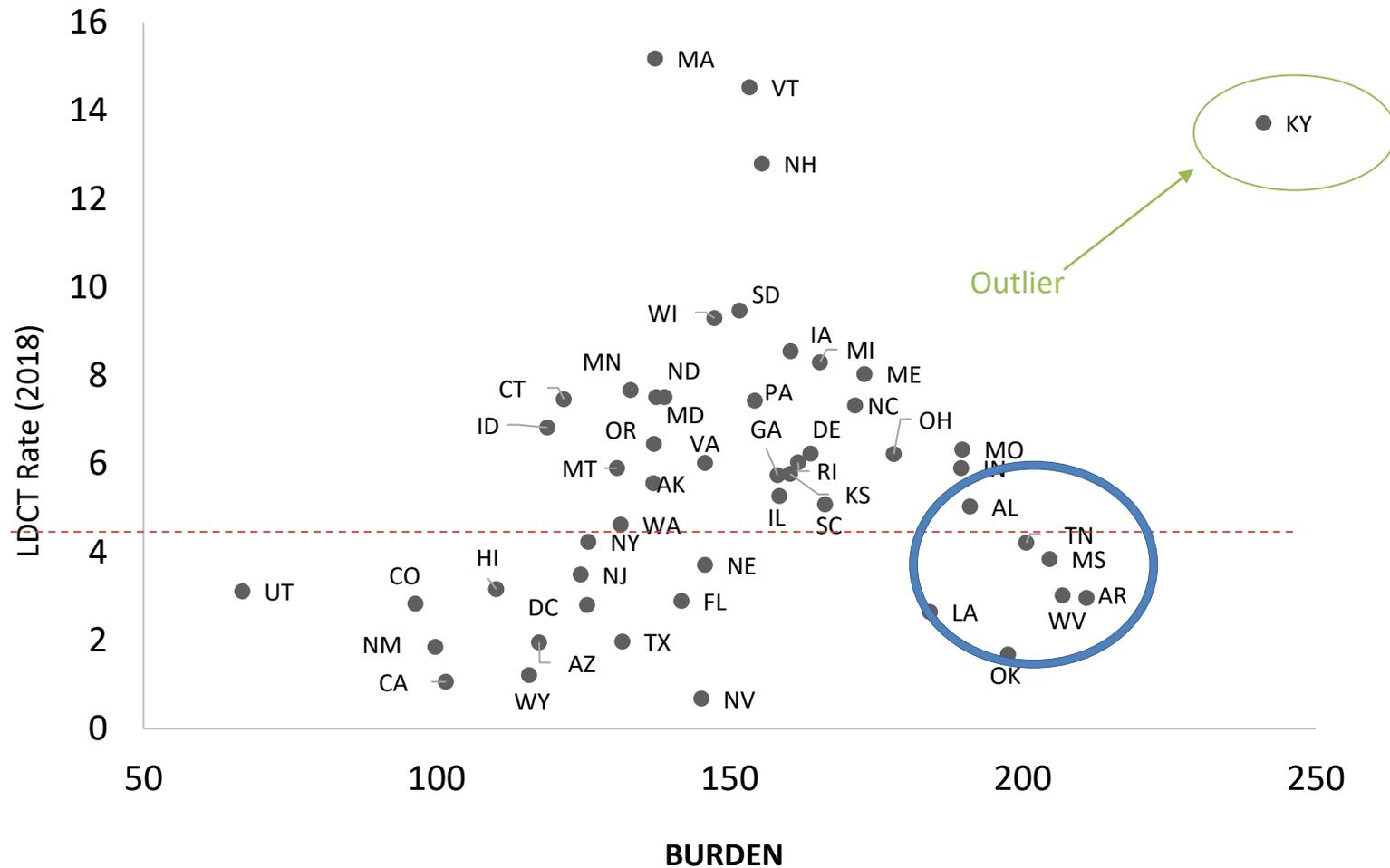
## A Three-Tiered Approach



## The Population Impact Pyramid



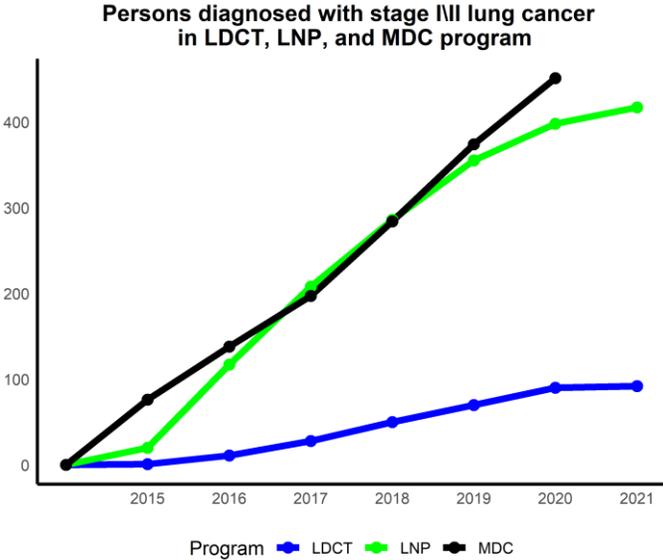
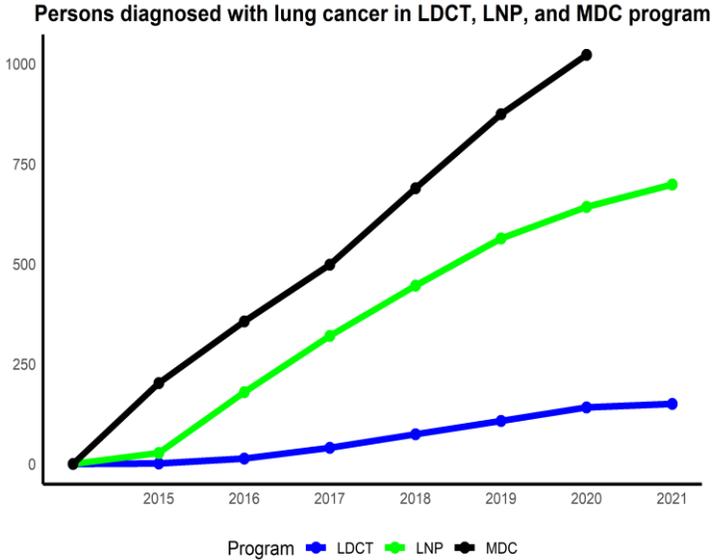
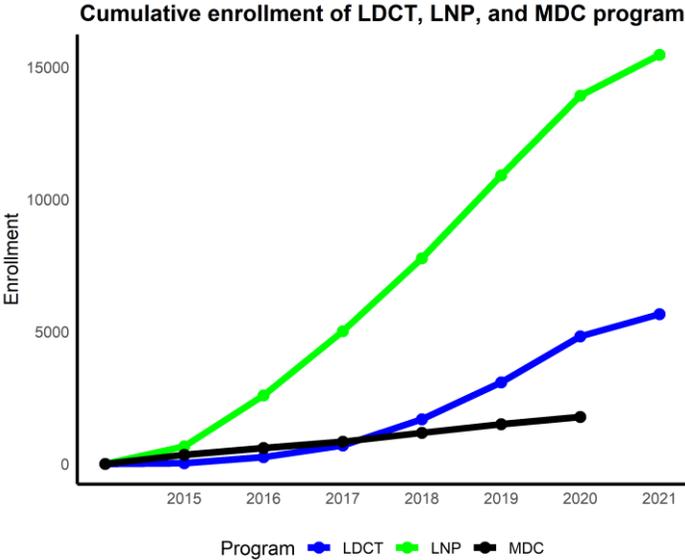
# Lung Cancer Burden v Screening: State-Level



Lung Cancer Mortality Rate Per 100,000 Adults 55-80 years (2013-2017)

# Cumulative Enrollment, Lung Cancer Diagnoses:

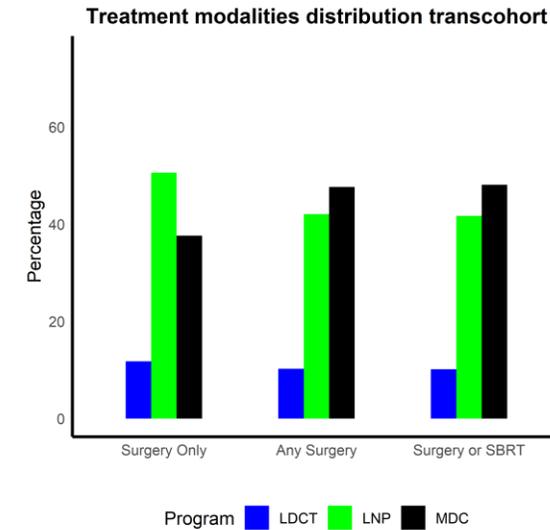
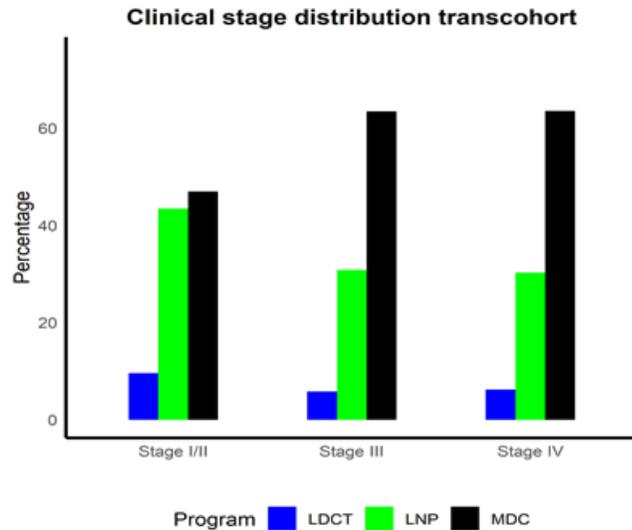
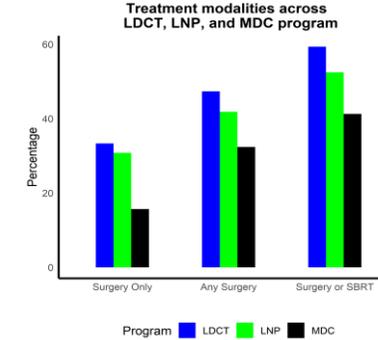
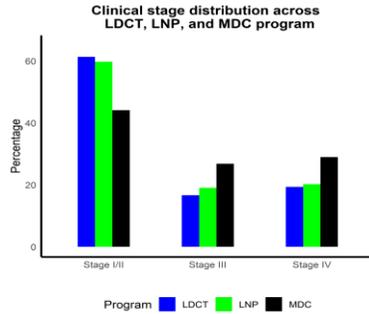
## DELUGE in the Mississippi Delta: LDCT v LNP v MDC 2015 - 2021



Osarogiagbon, et al. Manuscript under peer review

# Stage Distribution, Curative-Intent Treatment, Survival

## DELUGE in the Mississippi Delta: LDCT v LNP v MDC



Osarogiagbon, et al. Manuscript under peer review

# DELUGE in the Mississippi Delta: LDCT v LNP v BMHCC

	LDCT	LNP	BMHCC
<b>Demographics</b>	N = 156	N = 772	N = 1150
<b>Age, median (Q1 - Q3)<sup>†</sup></b>	68 (64 - 72)	69 (63 - 76)	68 (61-75)
<b>Race</b>			
<b>White</b>	84	71	69
<b>Black</b>	16	27	30
<b>Other/Not Reported</b>	0	2	1
<b>Smoking Status</b>			
<b>Active</b>	72	46	41
<b>Former</b>	28	40	45
<b>Never</b>	0	13	13
<b>Pack years - Former Smoker</b>			
<b>Median (Q1-Q3)<sup>†</sup></b>	55 (40.75 - 72.5)	41 (24.25 - 60)	20.25 (21.5 - 60)
<b>Quit Duration - Former Smoker</b>			
<b>Median (Q1-Q3)<sup>†</sup></b>	8 (2.75 - 11.25)	16 (7 - 28)	11 (4 - 24)

# Incidental Pulmonary Nodule Programs (BMHCC)

	Oct	Nov	Overall
How many new patients (system)?	409	545	24,220
Desoto, MS	89	109	3,678
Golden Triangle, MS	*	*	463
Jackson, MS	*	*	2,463
Memphis, TN <sup>^</sup>	174	213	14,139
NEA, Jonesboro, AR	59	84	2,716
New Albany/Booneville, MS	68	72	343
Oxford, MS	28	67	418

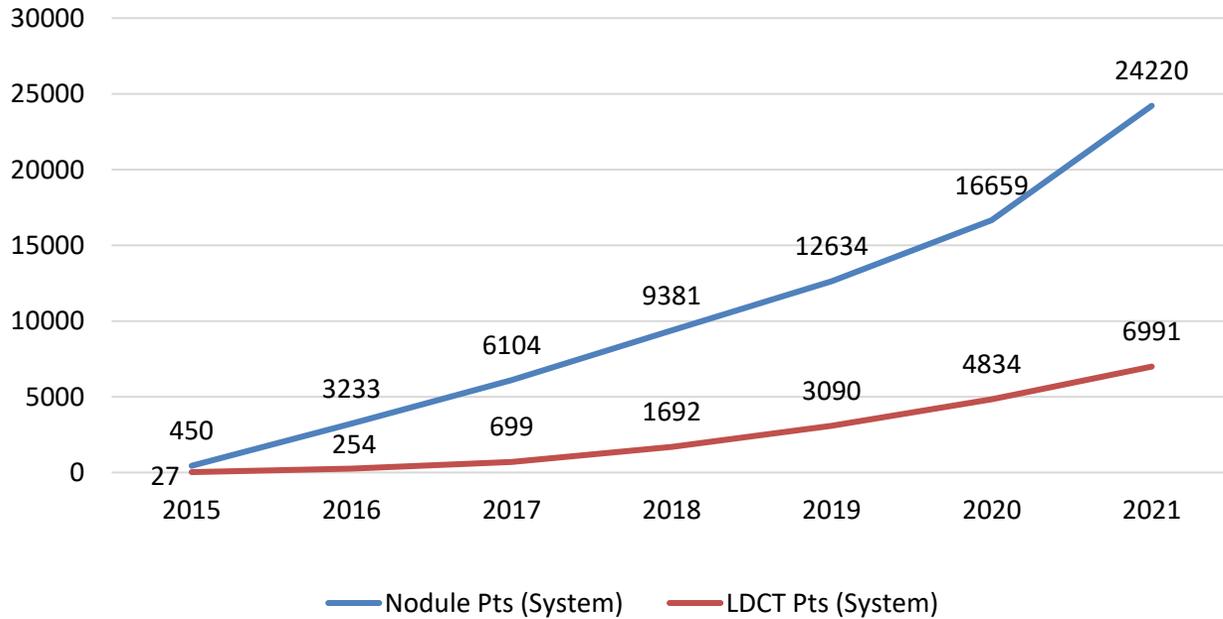
	Oct	Nov	Overall
Lung Cancer Dx (system):	11	6	1498
Desoto, MS	0	1	227
Golden Triangle, MS	*	*	39
Jackson, MS	*	*	215
Memphis, TN	8	4	799
NEA, Jonesboro, AR	1	0	187
New Albany, MS	2	0	4
Oxford, MS	0	1	27

\*not abstracted yet

<sup>^</sup> includes BMH-Memphis, OCC, Collierville, Tipton, Crittenden, Huntingdon

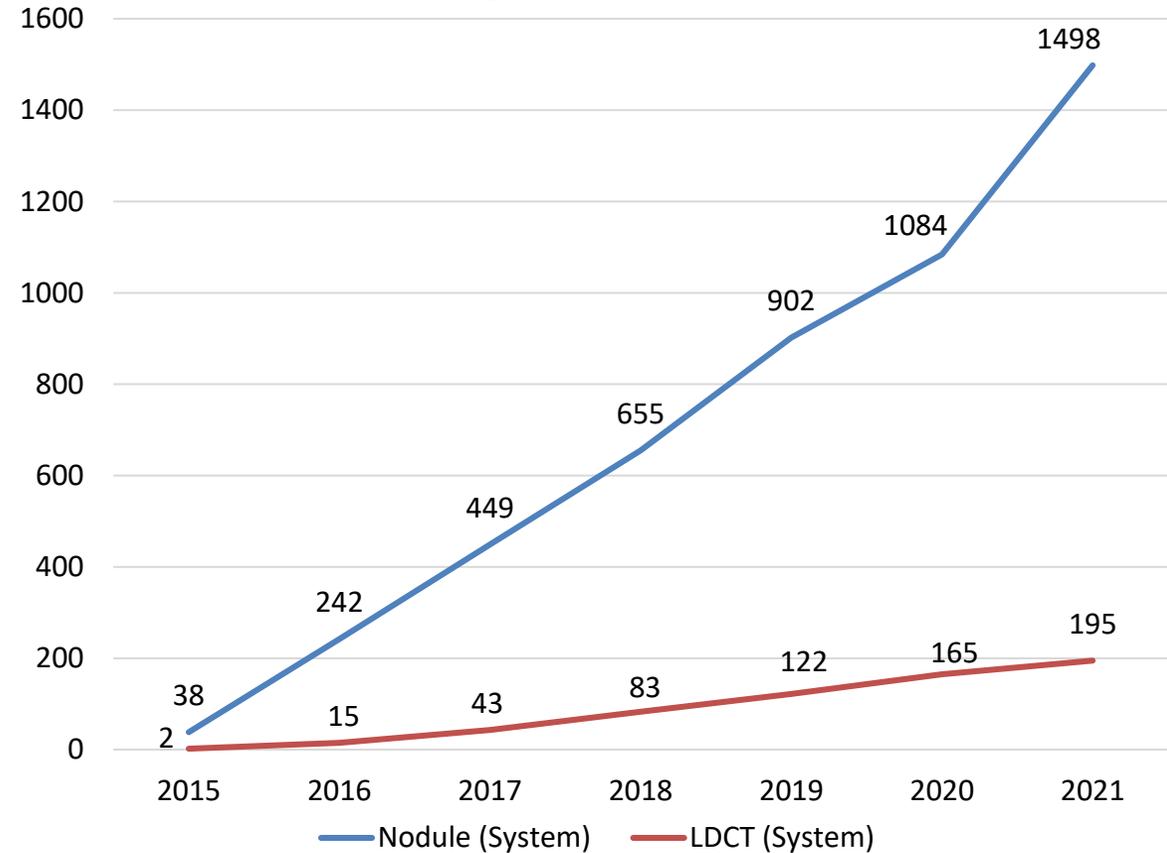
# Thoracic Early Detection Program Volumes

Persons Undergoing Scans in Complementary Early Detection Programs (Cumulative)



Annual Volumes	2015	2016	2017	2018	2019	2020	2021
Nodule	450	2783	2871	3277	3253	4025	7561
LDCT	27	277	445	993	1398	1744	2157

New Cancers Diagnosed (System - Cumulative)



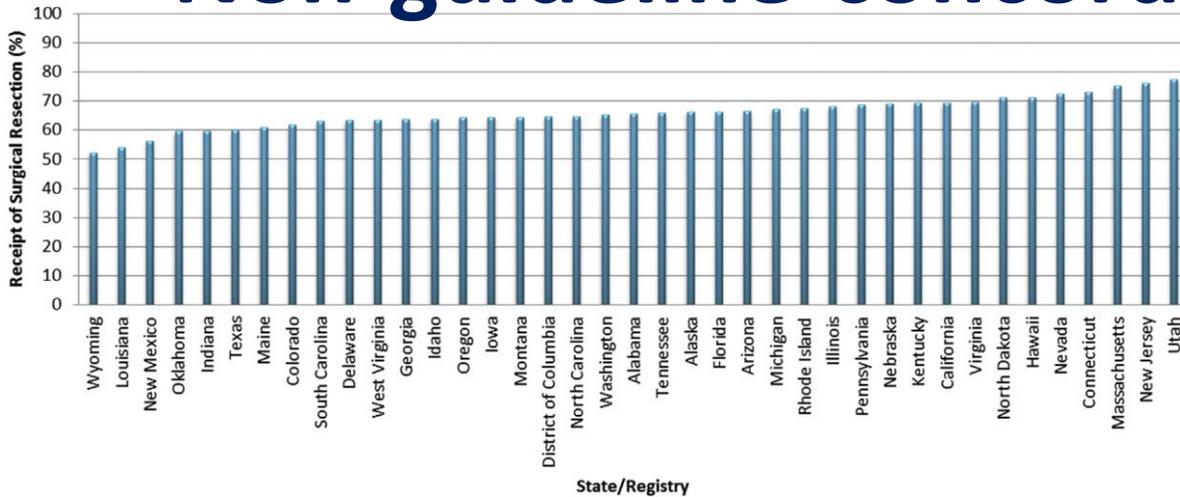
Rates of Detection  
 Nodule – 6.2%    LDCT – 2.8%

# Great news!

**We found all these patients with early-stage lung cancer...**

*...now what do we do with them???*

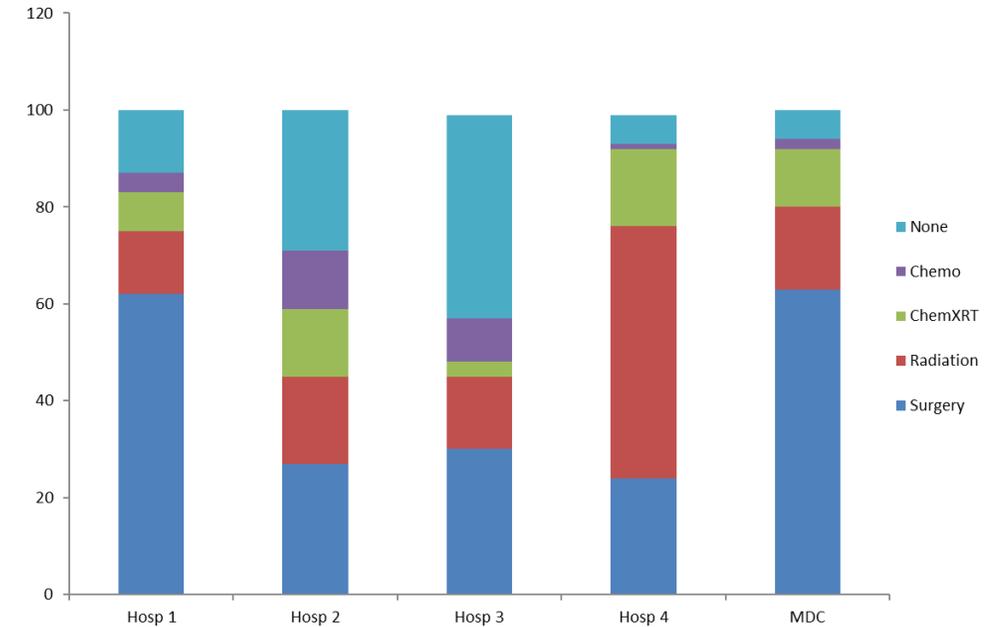
# Implementation Problem: Non-guideline-concordant Treatment Selection.



Sineshaw, Wu, Flanders, Osarogiagbon, Jemal. J Thorac Oncol 2016

**County-level range: 12.8% to 91.7%!**

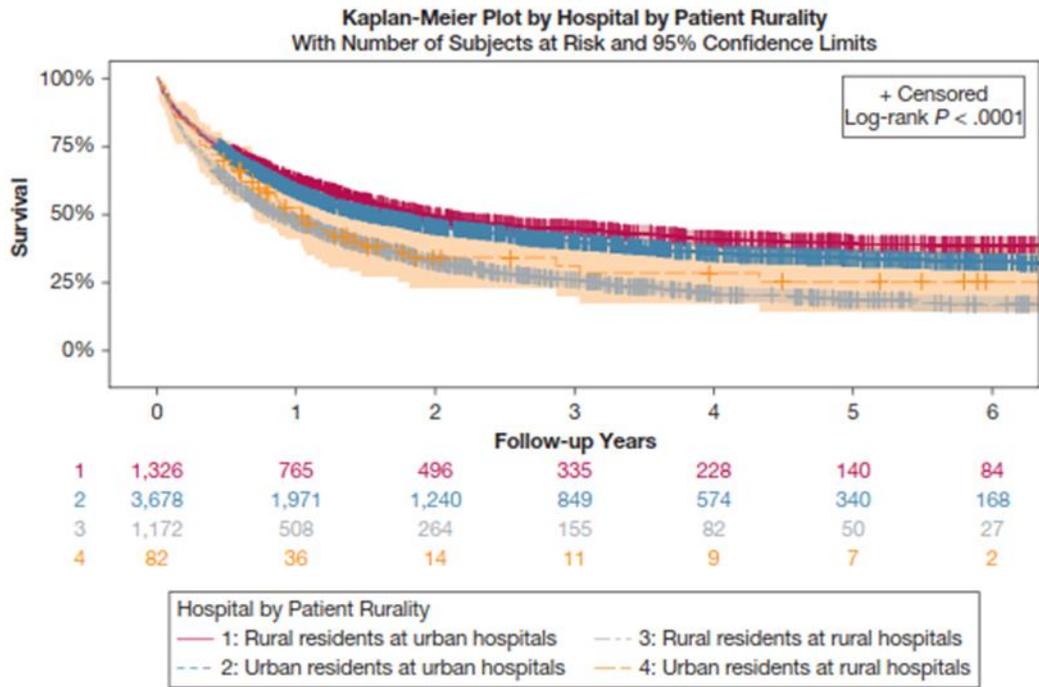
Sineshaw, Sahar, Osarogiagbon, Flanders, Yabroff, Jemal. Chest. 2020;157:212-222.



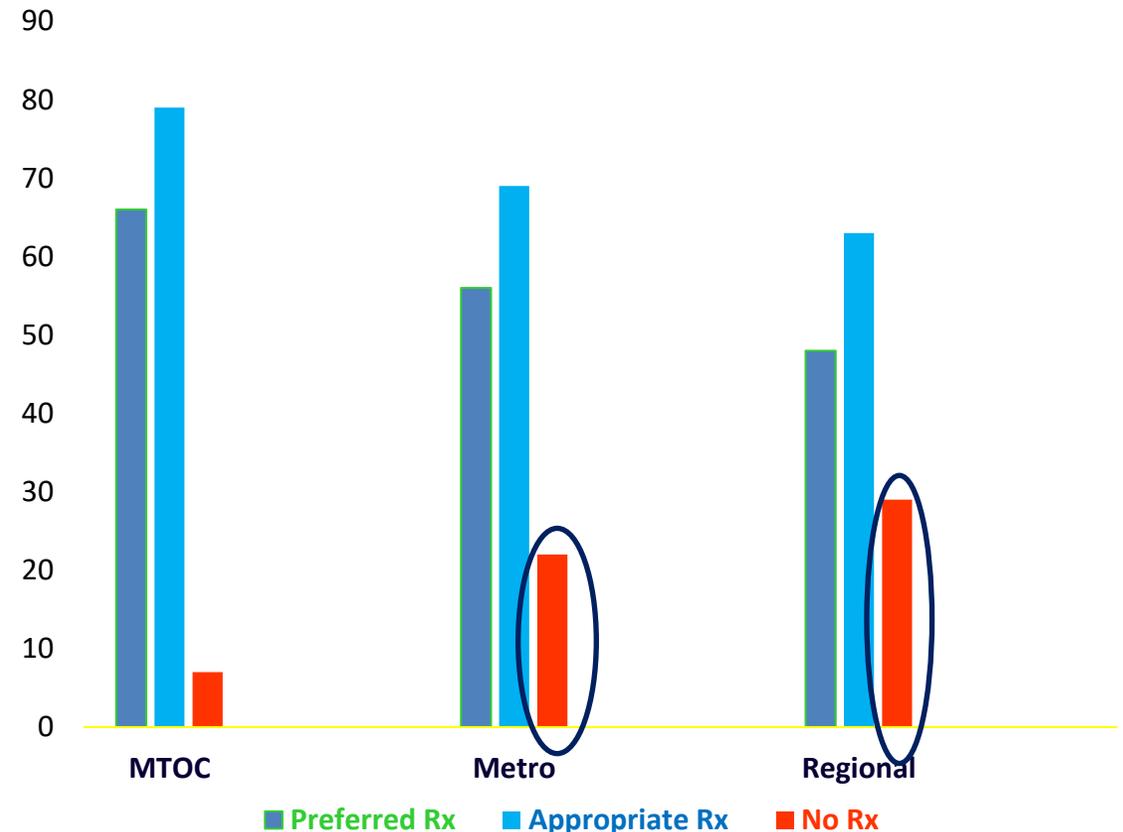
Treatment of Stage I/II NSCLC- Single Healthcare System. Osarogiagbon, Unpublished

# 'Building a multidisciplinary bridge across the quality chasm of thoracic oncology...'

Baptist Memorial Healthcare Corporation NSCLC patients 2011-2017

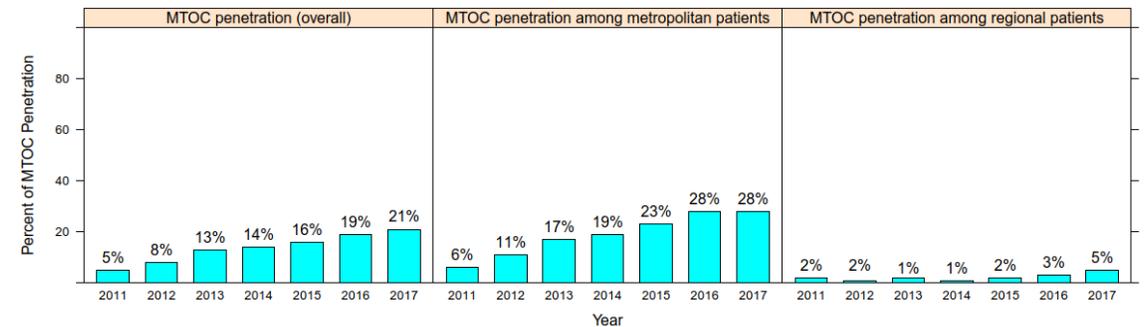
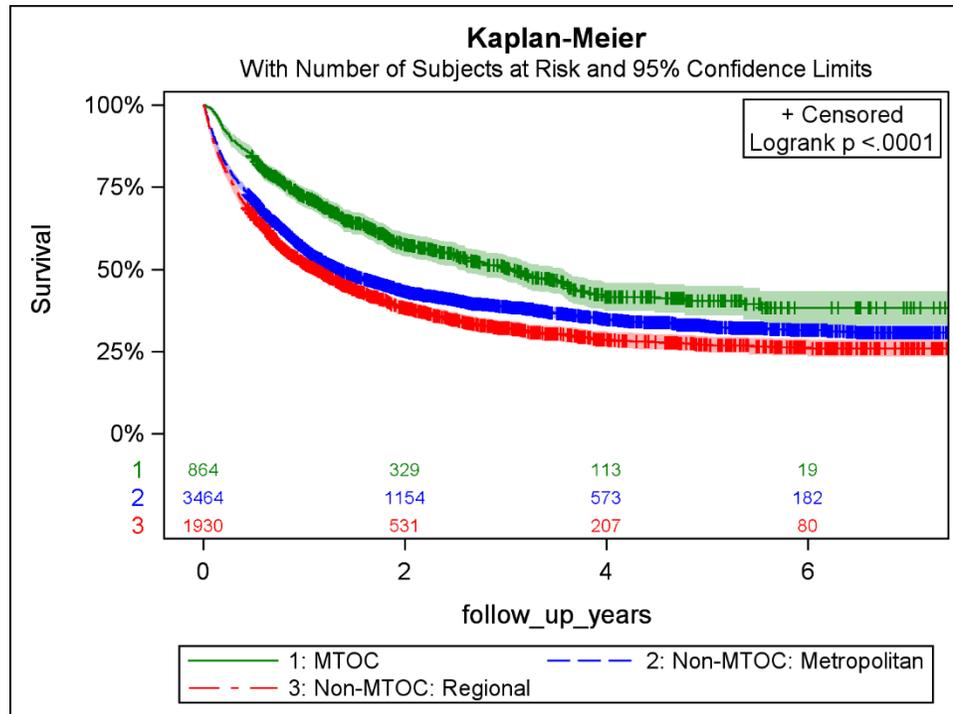


Ray MA, et al. CHEST. 2020;158:787-796.



Ray MA, et al. JTO Clinical and Research Reports Vol. 2 No. 8: 100203

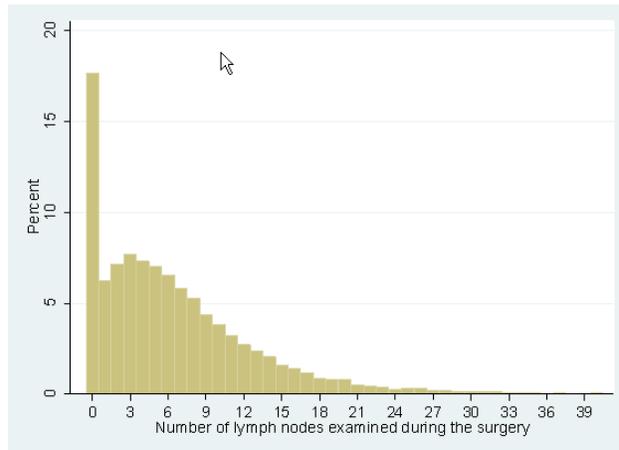
# Can Interdisciplinary Decision-Making Mitigate Rurality-Associated Outcome Disparities?



Ray MA, et al. JTO Clinical and Research Reports Vol. 2 No. 8: 100203

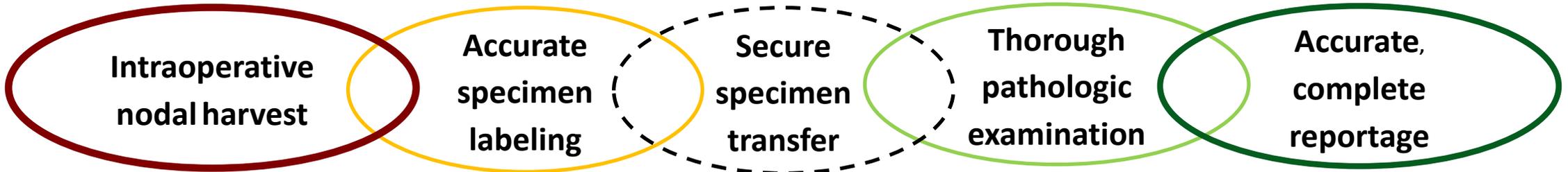
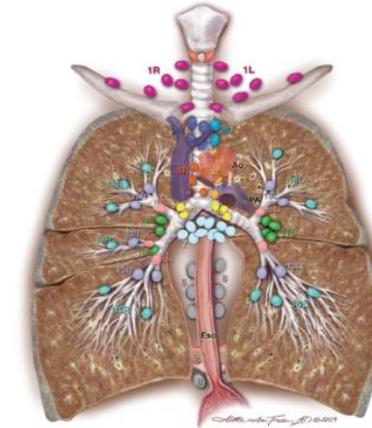
# Implementation Problem: Poor Quality Surgery

# Lymph Nodes Examined in 'Node Negative' NSCLC Resections:  
SEER 1998-2009



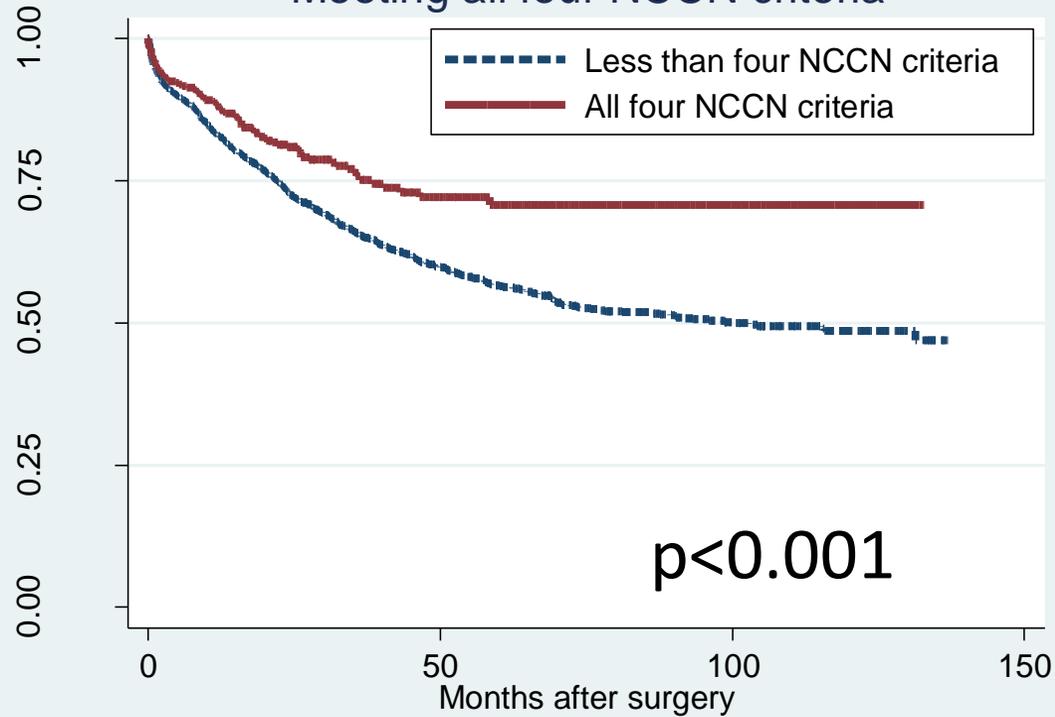
Osarogiabon and Yu. *Ann Thorac Surg* 2013;96:1178-89

Where the lymph nodes are...



The 'chain of responsibility' conceptual model

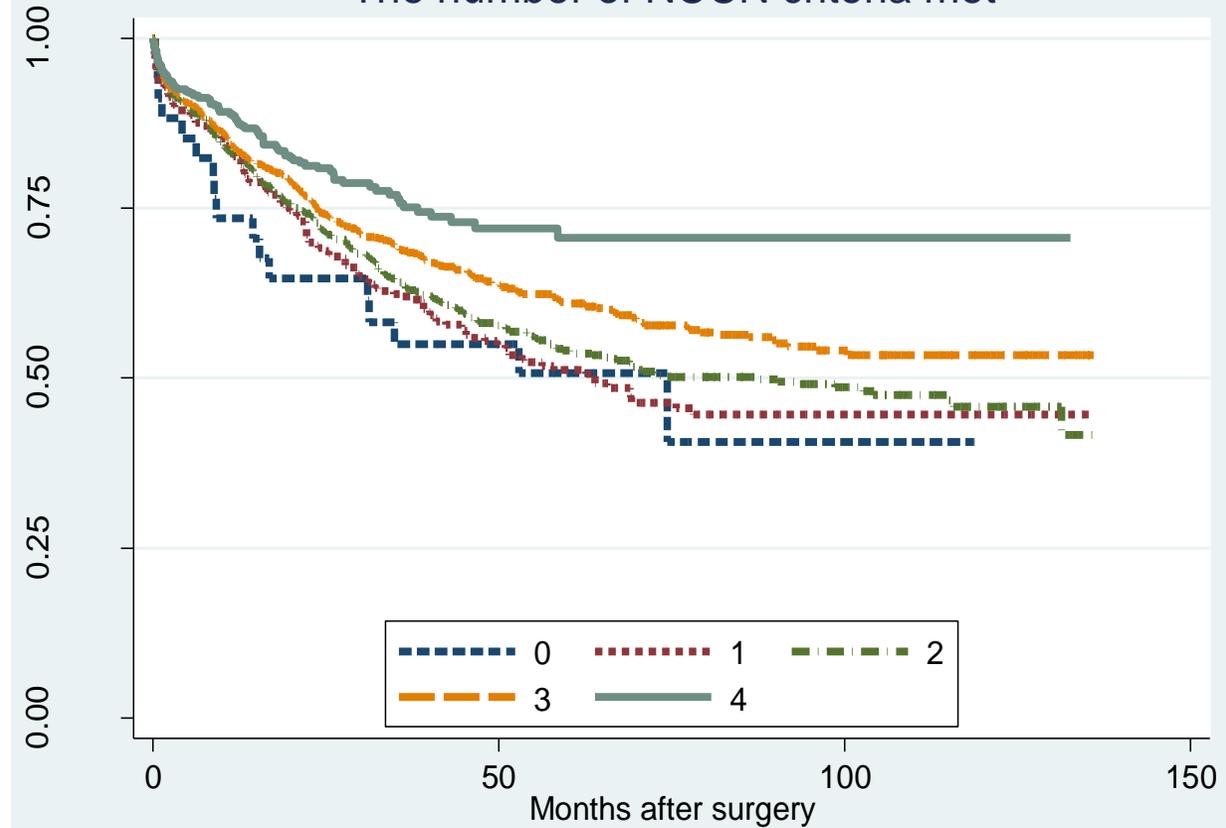
### Meeting all four NCCN criteria



Number at risk

nccn_criteria = 0	1892	782	204	0
nccn_criteria = 1	333	66	8	0

### The number of NCCN criteria met

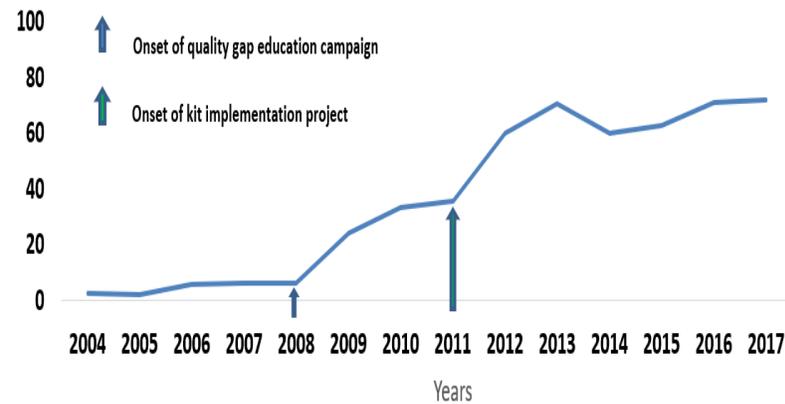


Adjusted hazard ratio of meeting all four criteria: 0.64 (0.50-0.80)

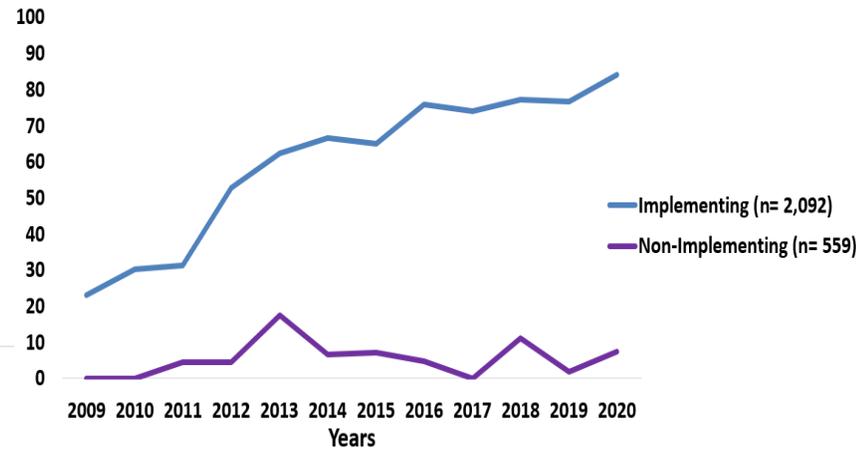
# Evolution of Benchmark Attainment

## Baptist Cancer Center Hospitals

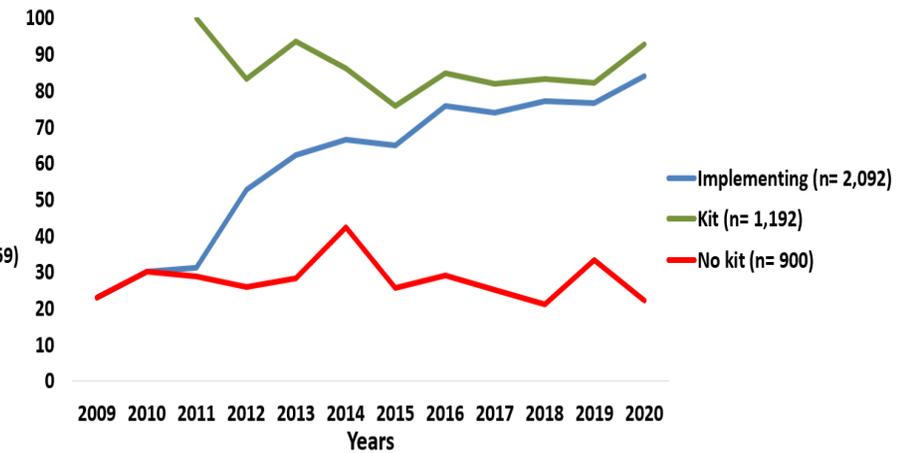
Attainment of National Comprehensive Cancer Network (NCCN) Surgical Quality Benchmark\*



## NCCN Implementing v. Non-Implementing (2009-2020)



## NCCN Implementing Institutions and Kit v. No Kit (2009-2020)

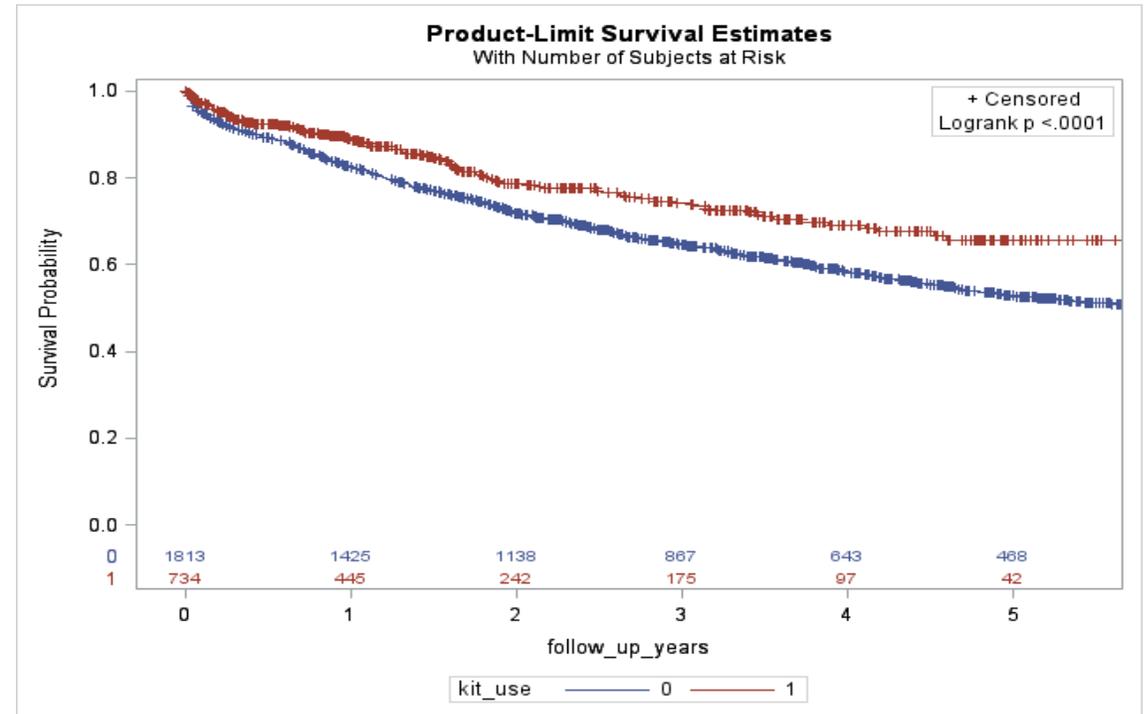
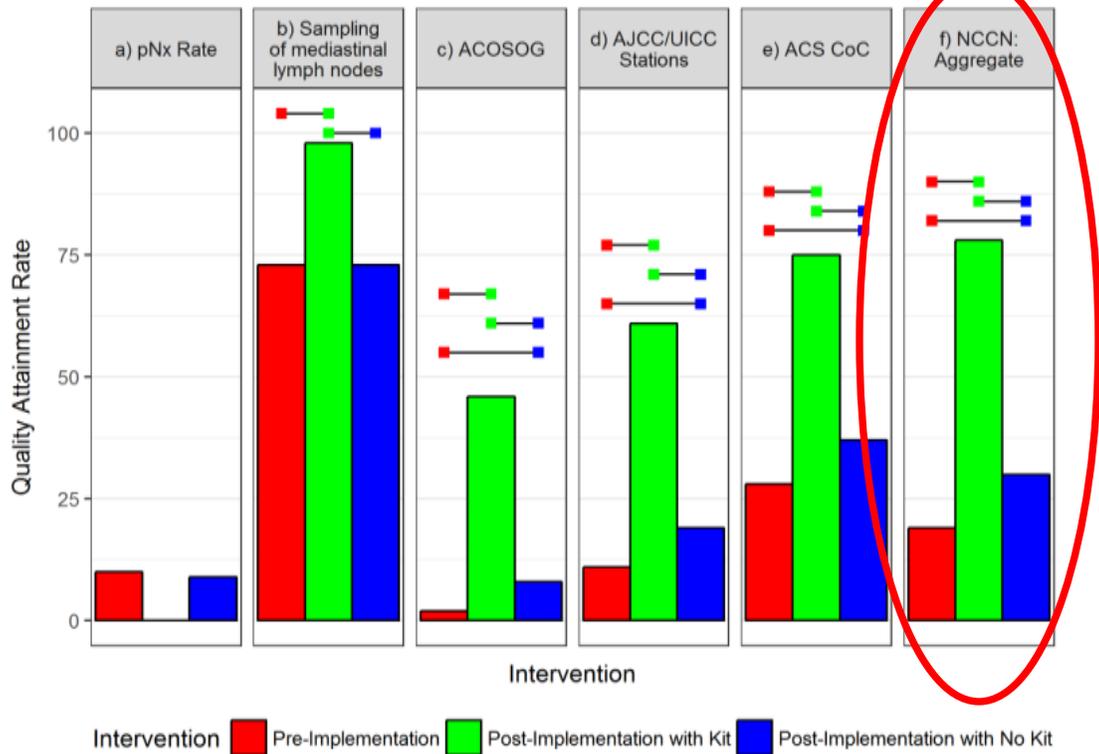


\*NCCN: Anatomic resection + negative margins + hilar/intrapulmonary node sampling +  $\geq 3$  mediastinal nodal station sampling

Osarogiagbon, et al. Unpublished 2021

# Lymph Node Collection Kit

## A Corrective Intervention to Improve Surgical Quality



Osarogiagbon et al. J Thorac Oncol. 2021. PMID: PMC8012255.

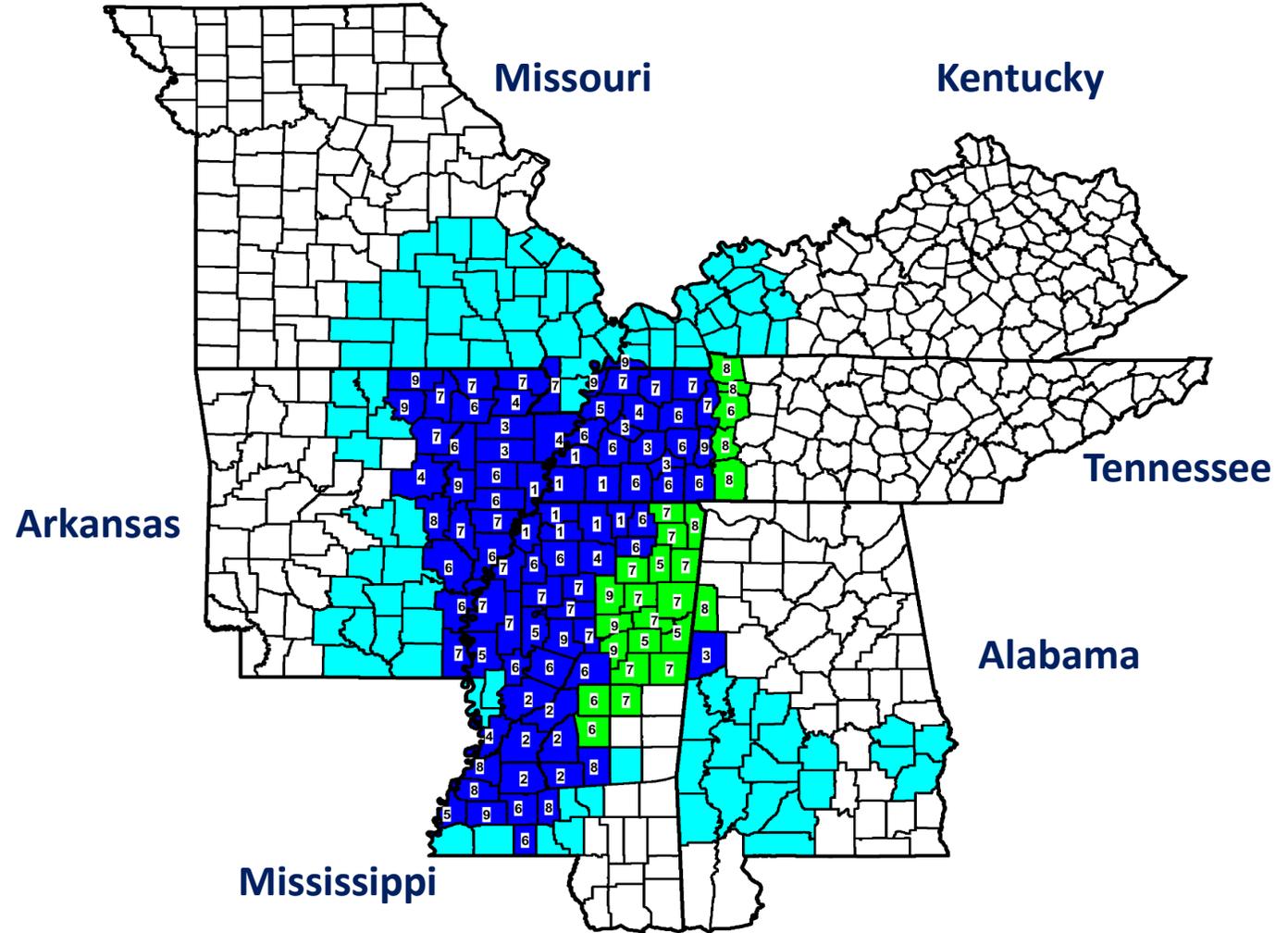
# Quantifying the Population-Level Impact

## Delta Regional Authority Persistent Poverty Counties

Difference-in-differences outcomes analysis: >25% decrease in lung cancer mortality

BMHCC catchment area versus control counties

- Pre-intervention baseline period: 2016-2020
- versus
- Post-intervention period: 2025-2029.



# MSM: Acknowledgements

## DELUGE

### Administrators

Parker Harris, MHA  
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Thoracic Surgery:

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### Past Support

Diane Richards

### Funding Support

Baptist Memorial Health  
Care Foundation

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### Past Support:

Penny Kershner  
Angela Fulford  
Laurie Quick  
Kristi Roark  
Shirley Banks  
Folabi Ariganjoye

### Funding Support

PCORI: IH-1304-6147: *'Building a multidisciplinary bridge across the quality chasm in thoracic oncology.'*

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Meredith Ray, PhD

### Epidemiologists

Matthew Smeltzer, PhD

### Past Support

Philip Ojeabulu, MD

### Funding Support

**2R01CA172253: 'Improving pathologic nodal staging of resected lung cancer.'**

## Tobacco Control

### Clinical Support

John Powell, NP  
Laura McHugh, RN  
Joy Luttrell, RN

### Pharmacy

Alexander Quesenberry  
Hannah Alley  
Glenn Roma

### Past Support

Laurie Quick  
Rachel Hendrix

## NCORP

### System Support

Reyna Aza Salinas  
Lucinda Boldien  
Paige Gibbons  
Mary Rehak  
Lori Lynch  
Tracy Stewart  
Ann Bishop

### Research Coordinators

Komal Lotay  
Laurel Morgan  
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### Past Support

Amber Siquefield  
Liset Taybo  
Emma Draluck  
Bianca Jackson  
Toya Kimble  
Manali Jaglekar  
Cheryl Houston-Harris  
Antoinette Stone  
Dawn Smith  
Linda Sullins  
Samantha Potts  
Shelia Carr  
Tracy Camp

### Funding Support

**Baptist Memorial Health Care/Mid South NCORP Minority Underserved Consortium: UGA1CA189873**

**The 'Mid-South Miracle' is now operationally funded by BMHCC with a 10-year commitment.**